National Climatic Data Center

DATA DOCUMENTATION

FOR

DATA SET 6141A (DSI-6141A)
Eta Data Assimilation System (EDAS)
Archive Information

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National Climatic Data Center
151 Patton Ave.
Asheville, NC 28801-5001 USA

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1. <u>**Abstract**</u>: The National Weather Service's <u>National Centers for Environmental Prediction</u> (NCEP) runs a series of computer analyses and forecasts operationally. One of the operational systems is the Global Data Assimilation System (GDAS, Kanamitsu, 1989), which uses the spectral Medium Range Forecast model (MRF) for the forecast. Another system is the <u>Eta Data Assimilation System</u> (EDAS), covering the U.S.

At NOAA's <u>Air Resources Laboratory</u> (ARL), NCEP model output are used for air quality transport and dispersion modeling. ARL archives both EDAS and GDAS data using a 1-byte packing method. Both archives contain basic fields such as the u- and v-wind components, temperature, and humidity. However, the archives differ from each other because of the horizontal and vertical resolution, as well as in the specific fields, provided by NCEP.

The archive data file contains the data in synoptic time sequence, without any missing records (missing data is represented by nulls and the forecast hour is set to negative 1). Therefore it is possible to position randomly to any point within a data file. Each file contains data for approximately two weeks: days one through 15, and 16 through the end of the month. At each time period, an index record is always the first record, followed by surface data, and then all data in each pressure level from the ground up.

<div align="center">Data Grid</div>

The data are on a 79 by 55 Lambert Conformal grid (Fig. 1). In Table 1, the data grid is identified by the model that produced the data, a grid identification number, the number of X and Y grid points, the Pole position (latitude and longitude) of the grid projection, a reference latitude and longitude, the grid spacing (km) which is true at the reference point, the orientation with respect to the reference longitude, the angle between the axis and the cone, and a point on the grid in grid units and latitude and longitude . The given pole position results in the lowest left grid point to have a value of (1,1).

```
  --------------------------------------------------------------------------------
                   Table 1. Data Grid Specifications
  --------------------------------------------------------------------------------
   Model ID  X    Y    Pole  Pole   Ref.  Ref.  Ref. Orient Cone Sync Sync Sync Sync
   Type  #  Max  Max  Lat.  Lon.   Lat.  Lon.  Grid        Ang.  X    Y   Lat. Lon.
  --------------------------------------------------------------------------------
   EDAS 38  79   55   90N   0W     35N   95W   80    0     25   39.0 25.0 35N  95W
  --------------------------------------------------------------------------------
```

<div align="center">ORIGIN OF THE DATA</div>

The 3-hourly archive data come from NCEP's EDAS. The EDAS was implemented into the operational early Eta model runs during 1995. The EDAS is an intermittent assimilation system consisting of successive 3-h Eta model forecasts and Optimum Interpolation (OI) analyses for a pre-forecast period (12-h for the early Eta) on a 38 level, 48 km grid. A 6-h forecast from the GDAS is used to to start the assimilation at 12-h prior to model start time. The following is a schematic for the 12Z cycle

:
:   3:
:

```
  6-h GDAS    | 3-h eta | 3-h eta | 3-h eta | 3-h eta | 48-h Eta
-----------> |-------->|-------->|-------->|-------->|-----------------...-->
  Forecast   | fcst  | fcst  | fcst  | fcst  | forecast
            00Z     03Z     06Z     09Z     12Z
where;
    |
    | = Eta OI analysis
    |
```

The 3-h analysis updates allow for the use of high frequency observations,
such as wind profiler, NEXRAD, and aircraft data. ARL saves the successive 3-
hour analyses, twice each day to produce a continuous data archive. Some
fields such as precipitation and surface fluxes are not available in the
analysis files, therefore these are taken from the successive 3-hour forecast
files. The 48 km data are interpolated to a 40 km, Lambert Conformal Grid,
covering the continental United States.

                         ARL PROCESSING

The ARL archiving program extracts every other grid point of the 3 hourly, 40
km data to produce a 3 hourly, 80 km dataset on pressure surfaces. In
addition, 14 gridpoints on the western end of the model domain and 10
gridpoints on the northern end of the domain are removed to reduce the size of
the semi-monthly files (currently at about 84 Mbytes). The data are put into
semi-monthly files and saved for shipment to NCDC. About 6 months of EDAS
data are also put online at ARL's web site for easy access via ftp:

        http://www.arl.noaa.gov/ss/transport/archives.html

2.   Element Names and Definitions:

```
    -----------------------------------------------------------------------------
        Table 2. Meteorological Fields contained in the EDAS Archive.
    -----------------------------------------------------------------------------
    Field                                              Units Label  Data Order
    _____
    Pressure reduced to mean sea level                 hPa   MSLP   S1
    Temperature at surface                             K     TMPS   S2
    Accumulated precipitation (3 h accumulation)       m     TPP3   S3
    Accumulated convective precipitation (3 h accumulation)  m  CPP3  S4
    Volumetric soil moisture content                   frac. SOLW   S5
    Temperature at 2m AGL                              K     T02M   S6
    Relative Humidity at 2m AGL                        %     RH2M   S7
    U-component of wind at 10 m AGL                    m/s   U10M   S8
    V-component of wind at 10 m AGL                    m/s   V10M   S9
    Pressure at surface                                hPa   PRSS   S10
    Categorial snow (yes=1, no=0)                      -     CSNO   S11
    Categorial rain (yes=1, no=0)                      -     CRAI   S12
    Latent heat net flux at surface                    W/m2  LHTF   S13
    Sensible heat net flux at surface                  W/m2  SHTF   S14
    Momentum flux, u-component at surface              N/m2  UMOF   S15
    Momentum flux, v-component at surface              N/m2  VMOF   S16
    Low cloud cover                                    %     LCLD   S17
    Medium cloud cover                                 %     MCLD   S18
    High cloud cover                                   %     HCLD   S19
    Total cloud cover                                  %     TCLD   S20
    Downward short wave radiation flux                 W/m2  DSWF   S21
    U-component of wind with respect to grid           m/s   UWND   U1
    V-component of wind with respect to grid           m/s   VWND   U2
```

:
:   4:
:

```
Geopotential height                                gpm*  HGTS  U3
Temperature                                        K     TEMP  U4
Pressure vertical velocity                         hPa/s WWND  U5
Relative humidity                                  %     RELH  U6
--------------------------------------------------------------------------------
* geopotential meters
--------------------------------------------------------------------------------
```

Meteorological Fields and Vertical Structure

The archived data files contain only some of the fields normally produced by the model at NCEP. These were selected according to what is most relevant for transport and dispersion studies and disk space limitations. In Table 2, the fields are identified by a description, the units, and a unique four character identification label that is written to the header label of each record. Data order in the file is given by a two digit code. The first digit indicates if it is a surface (or single) level variable (S) or an upper level variable (U). The second digit indicates the order in which that variable appears in the file. The upper level EDAS data are output on the following 22 pressure surfaces. Table 3 gives the level number corresponding to each data level, which is also written to each header label.

```
          -------------------------------------------------------------------
              Table 3. Description of Vertical Levels
          -------------------------------------------------------------------
                   Level    Height
          -------------------------------------------------------------------
                    22      50 hPa
                    21     100 hPa
                    20     150 hPa
                    19     200 hPa
                    18     250 hPa
                    17     300 hPa
                    16     400 hPa
                    15     500 hPa
                    14     550 hPa
                    13     600 hPa
                    12     650 hPa
                    11     700 hPa
                    10     750 hPa
                     9     800 hPa
                     8     825 hPa
                     7     850 hPa
                     6     875 hPa
                     5     900 hPa
                     4     925 hPa
                     3     950 hPa
                     2     975 hPa
                     1    1000 hPa
                     0     surface
```

Definition File - EDAS.CFG

```
        MODEL TYPE:     EDAS
        GRID NUMB:      38
        VERT COORD:      2
        POLE LAT:       90.
```

:
:
:

```
POLE LON:          0.
REF LAT:          35.
REF LON:         -95.
REF GRID:         80.0
ORIENTATION:      0.
CONE ANGLE:       25.
SYNC X:           39.0
SYNC Y:           25.0
SYNC LAT:         35.
SYNC LON:        -95.
SPECIAL:           0.
NUMB X:           79
NUMB Y:           55
NUMB LEVELS:      23
LEVEL 1:           0.    21 MSLP TMPS TPP3 CPP3 SOLW T02M RH2M
                           U10M V10M PRSS CSNO CRAI LHTF SHTF
                           UMOF VMOF LCLD MCLD HCLD TCLD DSWF
LEVEL 2:        1000.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 3:         975.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 4:         950.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 5:         925.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 6:         900.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 7:         875.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 8:         850.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 9:         825.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 10:        800.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 11:        750.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 12:        700.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 13:        650.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 14:        600.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 15:        550.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 16:        500.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 17:        400.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 18:        300.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 19:        250.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 20:        200.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 21:        150.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 22:        100.    06 UWND VWND HGTS TEMP WWND RELH
LEVEL 23:         50.    06 UWND VWND HGTS TEMP WWND RELH
```

3. **Start Date**: 19970101

4. **Stop Date**: Ongoing.

5. **Coverage**: North America

    a. Southernmost Latitude: 25N
    b. Northernmost Latitude: 50N
    c. Westernmost Longitude: 125W
    d. Easternmost Longitude: 65W

6. **How to Order Data**:

    Ask NCDC's Climate Services about the cost of obtaining this data set.
    Phone: 828-271-4800
    FAX: 828-271-4876

:
:

E-mail: **NCDC.Orders@noaa.gov**

7.   Archiving Data Center:

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, NC 28801-5001
Phone: (828) 271-4800.

8.   Technical Contact:

National Climatic Data Center
Federal Building
151 Patton Avenue
Asheville, NC 28801-5001
Phone: (828) 271-4800.

NOAA-Air Resources Laboratory
1315 East-West Highway
Silver Spring, MD 20910
Phone: (301 713-0295)

9.   Known Uncorrected Problems: None.

10.   Quality Statement: No information provided with original documentation.

11.   Essential Companion Datasets: None.

12.   References:

Kanamitsu, M., 1989: Description of the NMC Global Data Assimilation and Forecast System, Weather and Forecasting, 4 (335-342).

Petersen, R.A. and J.D. Stackpole, 1989: Overview of the NMC Production Suite, Weather and Forecasting, 4 (313-322).

Sela, J.G., 1980: Spectral modeling at the National Meteorological Center, Mon. Wea. Rev., 108 (1279-1292).